

CLAIMS

1. A method for transferring data in a storage system, comprising:

5 setting a first catch-up threshold for accepting data requests from a first port, the first catch-up threshold corresponding to a number of requests collected from a first queue for each CPU interrupt, the first queue being configured to receive requests to the first port and store the requests to be collected by a central processing unit (CPU); and

adjusting the first catch-up threshold to reduce an imbalance between the number of requests made to the first queue and a number of requests made to a second queue during a time period, the second queue being configured to receive and store requests
10 from the CPU to the first port.

2. A method for transferring data in a storage system as recited in claim 1, further comprising:

15 setting a second catch-up threshold for accepting data requests from a second port, the second catch-up threshold corresponding to a number of requests collected from a third queue for each CPU interrupt, the third queue being configured to receive requests to the second port and store the requests to the second port to be collected by the CPU; and

adjusting the second catch-up threshold to reduce an imbalance between the
20 number of requests made to the third queue and a number of requests made to a fourth queue during the time period, the fourth queue being configured to receive and store requests from the CPU to the second port.

3. A method for transferring data in a storage system as recited claim 1, wherein the first queue and the second queue are circular queues.

5 4. A method for transferring data in a storage system as recited claim 1, wherein the first queue is at least one of a command queue and a completion queue and the second queue is at least one of a data transfer queue and a status queue.

5. A method for transferring data in a storage system as recited in claim 1,
10 wherein adjusting the first queue value includes,

detecting if the number of requests to the first queue is less than the number of requests to the second queue in the time period; and

increasing the first catch-up threshold in response to detecting that the number of requests to the first queue is less than the number of requests to the second queue in the
15 time period.

6. A method for transferring data in a storage system as recited in claim 1, wherein adjusting the first queue value includes,

detecting if the number of requests to the first queue is greater than the number of
20 requests to the second queue in the time period; and

decreasing the first catch-up threshold in response to detecting that the number of requests to the first queue is greater than the number of requests to the second queue in the time period.

5 7. A method for transferring data in a storage system with a central processing unit (CPU) for communicating with at least one port, comprising:

 monitoring data being transferred between a front end port and a back end port through the CPU;

 determining whether a data transfer queue is running at an equivalent transfer rate
10 as a command queue; and

 adjusting a catch-up threshold to reduce an imbalance between a number of writes to the command queue and a number of writes to the data transfer queue.

 8. A method for transferring data in a storage system with a CPU as recited
15 in claim 7, wherein adjusting the catch-up threshold includes increasing the catch-up threshold when the data transfer queue is running at a lower transfer rate than the command queue and decreasing the catch-up threshold when the data transfer queue is running at a higher transfer rate than the command queue.

20 9. A method for transferring data in a storage system with a CPU as recited in claim 7, wherein the command queue and the data transfer queue are circular queues.

10. A method for transferring data in a storage system with a CPU as recited in claim 7, wherein the determining whether a data transfer queue is running at an equivalent transfer rate as a command queue includes,

tracking a number of writes to each of the data transfer queue and the command
5 queue during a time period.

11. A method for transferring data in a storage system with a CPU as recited in claim 10, further comprising:

determining if the number of writes to the data transfer queue is greater than the
10 number of writes to the command queue during the time period.

12. A method for transferring data in a storage system with a CPU as recited in claim 7, further comprising:

collecting event data associated with the data being transferred between the front
15 end port and the back end port through the CPU.

13. A method for transferring data in a storage system with a CPU as recited in claim 12, wherein the adjusting a catch-up threshold includes,

analyzing the event data, the analysis of the event data being considered when
20 adjusting the catch-up threshold.

14. A computer readable medium with program instructions for transferring data in a storage system, the computer readable medium comprising:

program instructions for setting a first catch-up threshold for accepting data requests from a first port, the first catch-up threshold corresponding to a number of requests collected from a first queue for each CPU interrupt, the first queue being configured to receive requests from the first port and store the requests to be collected by a central processing unit (CPU); and

program instructions for adjusting the first catch-up threshold to reduce an imbalance between the number of requests made to the first queue and a number of requests made to a second queue in a time period, the second queue being configured to receive requests from the CPU and to store the requests to be collected by the first port.

15. A computer readable medium with program instructions for transferring data in a storage system as recited in claim 14, further comprising:

program instructions for setting a second catch-up threshold for accepting data requests from a second port, the second catch-up threshold corresponding to a number of requests gathered from a third queue for each CPU interrupt, the third queue being configured to receive requests from the second port and store the requests from the second port to be collected by the CPU; and

program instructions for adjusting the second catch-up threshold to reduce an imbalance between the number of requests made to the third queue and a number of requests made to a fourth queue in the time period, the fourth queue being configured to

receive requests from the CPU and to store the requests from the CPU to be collected by the second port.

16. A computer readable medium with program instructions for transferring
5 data in a storage system as recited in claim 14, further comprising:

program instructions for detecting if the number of requests to the first queue is less than the number of requests to the second queue in the time period; and

program instructions for increasing the first queue value in response to detecting that the number of requests to the first queue is less than the number of requests to the
10 second queue in the time period.

17. A storage sub-system providing access to stored data, comprising:

a first port providing access to a host requesting data, the first port having a first port catch-up queue, the first port catch-up queue configured to store Input/Output (I/O)
15 transactions associated with read and write requests from the host, an amount of I/O transactions posted to the first port catch-up queue at a time being controlled by a first port catch-up threshold;

a second port providing access to the stored data;

a central processing unit (CPU) in communication with the first port and the
20 second port, the central processing unit configured to process the amount of I/O transactions per a single interrupt; and

a cache memory configured to store the stored data accessed through the second port.

18. The storage sub-system of claim 17, wherein the second port includes a
5 second port catch-up queue, the second port catch-up queue configured to store control data associated with retrieval of data requested by the host, an amount of the control data posted to the second port catch-up queue at a time being controlled by a second port catch-up threshold.

10 19. The storage sub-system of claim 18, wherein the first port catch-up threshold is equal to the second port catch-up threshold.

20. The storage sub-system of claim 17, further comprising:
a main memory storing the first port catch-up threshold.

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21. The storage sub-system of claim 17, wherein the first port catch-up queue includes,

a command queue;

a data transfer queue;

20 a completion queue; and

a status queue.